sion. It is right to state that Mr. W. C. Trevelyan, in the 2nd edition of his paper upon the botany of the Feroe Isles (printed at Florence), has shortly characterized our present subject under the name of *A. argentea* (Don). He finds it to be plentiful in those islands.

I propose to name and characterize the plant as follows:—

Alchemilla conjuncta (Bab. MSS.). Foliis radicalibus peltato-palmatis 5-7 partitis, laciniis oblongis obtusis apice adpresso-serratis subtus albo-sericeis ad ⅓ conjunctis, corymbis parvis lateralibus terminalibusque distantibus.

A. argentea, *G. Don, MSS.*! *in Borr. Herb., Trevelyan in Bot. of Feroe Islands,* not *Lam. Enc.* 1. 77.

Closely allied to *A. alpina*, but usually much larger in all its parts, and distinguished by not having its leaflets separated to their base, broader, more silky beneath, and spreading from the petiole in such a manner, that in the radical leaves the two external leaflets almost, if not quite, touch each other, so that at first sight the whole leaf presents the appearance of being peltate. The stems have long alternate spreading branches which are often again subdivided, and the flowers, which are more silky and upon longer stalks than those of *A. alpina*, are collected into small, nearly simple, distant corymbs. In *A. alpina* the leaflets are separated to the base, and form a digitate not at all palmate leaf, the outer ones being very distant from each other, or even nearly opposite.

VIII.—*Contributions to the Ichthyology of Australia.* By John Richardson, M.D., F.R.S., &c., Inspector of Hospitals, Haslar.

[Continued from vol. ix. p. 393.]

Gerres filamentosus (*Cuv. et Val.*).

No. 4. Mr. Gilbert's collection, Sept. 1840.

This fish, Mr. Gilbert informs us, is an inhabitant of a freshwater swamp at Port Essington, but he does not state whether the swamp communicates with the sea or not. The *Gerres lineatus* is also said to be taken in the freshwater lagoon of Colluco, but as the other species are marine, it is probable that these enter the fresh waters at certain seasons from the sea. Mr. Gilbert's specimen was obtained in the month of September. The same species was obtained by Messrs. Quoy and Gaimard at New Guinea, and by Messrs. Kuhl and Van Hasselt at Java. In the 'Histoire des Poissons' the *wooda-wahah* of Russell (p. 52. pl. 68.) is considered to belong to this species; but this appears to be somewhat doubtful, from the

second dorsal spine being represented as no stronger than the rest, and its filamentous tip as being very little prolonged. Russell's specific character also states "*spinâ anali unicâ*," whereas in our example of *filamentosus* the second and third spines are both very conspicuous and longer than the soft rays of the fin, the second being the strongest one, and but just perceptibly shorter than the third.

Both the anal and dorsal spines are much compressed. The first dorsal spine is very short, the second is as broad again in the direction of the axis of the fish as any of the others, and its filamentous tip, which in Mr. Gilbert's specimen is broken off, is stated in the 'Histoire des Poissons' to be long enough to reach to the caudal fin. The lateral line is strongly marked on scales smaller than the others. Rays.—D. 9|10; A. 3|7; P. 15; C. $17\frac{2}{2}$; V. 1|5.

The colours have of course faded in the dried specimen, but the scales still exhibit much pearly and silvery lustre with strong reflexions when moved in the light. Above the level of the pectoral each scale has a deep steel-blue bar along its middle producing about nine longitudinal lines, the intervals and all the under parts being silvery. There are about five of the blue lines with four silvery ones above the lateral line.

Dimensions.	inches.	lines.
Length from intermaxillary symphysis to tip of caudal	6	9
——— base of caudal	5	3
——— anal fin	3	10
——— ventrals	2	2
——— dorsal	2	2
——— pectorals	1	8
——— edge of gill-flap	1	7
——— centre of eye	0	$9\frac{1}{2}$
Diameter of eye	0	6
Depth of caudal fork	1	0
Height of third dorsal spine	1	0
——— of third anal spine	0	$8\frac{1}{2}$

Chætodon sexfasciatus (*Nob.*), Six-banded Chætodon.

Specimen in the British Museum.

The Chætodons with vertical bands do not appear to be numerous. Two species only are described in the 'Histoire des Poissons,' one of them (*striatus*) with five bands, and the second with eight (*octofasciatus*). A third species with bands (*chrysurus*) is mentioned in the 'Zoological Proceedings' for 1833 (p. 117), as existing in the seas of the Mauritius. Its bands are also eight, but they are angular in the middle. Mr. Gould brought a six-banded species from Western Australia, which is now in the British Museum.

Its profile, including the dorsal and anal fins, and excluding the parts before the eye and half the trunk of the tail with its fin, is nearly orbicular. The profile of the head is concave, and thus causes the

snout to appear to project more than it actually does. The curve of the back springs boldly from the middle of the orbit. The large eye just touches without altering the profile, and is the breadth of itself from the end of the snout. The preoperculum is strongly serrated on its vertical edge and rounded corner, but scarce perceptibly so on its horizontal limb. The operculum, as is usual with the Chætodons, is cut away in a wide shallow arc. The lateral line, formed by a series of short tubes, is nearly parallel to the back till it arrives opposite to the ends of the dorsal and anal, when the curve changes to a straight course through the tail. The scales have rectangular bases and sides, with a ciliated semicircular external edge. The uncovered surface is strongly marked by acute furrows corresponding in number with the marginal teeth.

Rays.—D. 10|20, last one divided ; A. 3|16 or 17 ; C. 17$\frac{3}{3}$; P. 17 ; V. 1|5.

The caudal is lunate on the margin : the pectorals are rounded. The dried specimen shows the following markings, but we have no knowledge of the colours of the recent fish. The ocular band occupies the upper surface of the head, from the lips to midway between the end of the snout and the beginning of the dorsal, and curving downwards embraces the whole orbit, becomes narrower on the cheek, yet takes in the angle and most of the upper limb of the preoperculum, and cuts the junction of the suboperculum and interoperculum in its course to the base of the ventrals ; its posterior edge makes a curve nearly similar to that formed by the margins of the dorsal and anal fins, but in the opposite direction, and the portion of the head lying before that curve projects out of the orbicular profile above mentioned. The second band, which is also broader above, commences immediately before the dorsal, and touching in its course the margin of the gill-cover and base of the pectoral, descends with a slight curve to the middle of the ventral, which is itself black. The third band encroaches a little on the scaly base of the dorsal, taking in the third and sixth spines, and becoming narrower in its direct course downwards, terminates before and in contact with the first anal spine. The fourth band, commencing near the tips of the first five jointed rays of the dorsal, descends to the first jointed anal rays. It is curved in an opposite direction to the anterior bands, and is broadest at the lateral line. The parts of the dorsal and anal fins behind the fourth band are black, and the fifth band is a narrow curved stripe which crosses the tail, and appears to be a continuation of the black curve formed by the margins of the fins. The sixth band is the narrowest, though blackest of all, and crosses the tail at the base of the caudal. The white spaces between the bands are narrower than the bands themselves. The extreme edges of the dorsal and anal are pale or whitish, and there is a yellowish tint on the caudal, its crescentic margin being very pale.

Dimensions.	inches.	lines.
Length from tip of snout to extremity of caudal fin	6	9
——————————— base of caudal.....	5	6
——————————— anal.....	3	6

Dimensions.	inches.	lines.
Length from tip of snout to dorsal	2	4¾
——————————— hinder margin of orbit	1	0
——————— orbit to end of dorsal or anal	4	0
Height of third, fourth and fifth dorsal spines	1	0
——— jointed rays of dorsal	0	9
——— second anal spine	0	8
——— jointed anal rays	0	7
Length of caudal fin	1	3
——— ventrals	1	4
——— ventral spine	0	9
——— pectorals	1	3

Drepane punctata, the Spotted Reaper-fish.

Chætodon punctatus, Solander, Pisc. Nov. Holl. ined. Parkins. No. 21.

"*Chætodon punctatus*. Habitat in Novâ Hollandiâ propè *Endeavour's Careening place*, ex oceano fluvios ascendens. Corpus latum, ferè subrotundum, valdè compressum. Caput majusculum, infra oculos squamosum, aliàs nudum, supra oculos declive. Oculi magni, iris argentea, pupilla nigra. Os parvum. Dentes setacei, minimi, conferti, tantummodo in maxillis; faux, lingua et palatum glabræ. Maxillæ obtusæ. Nares propè oculos, rotundi, minores aperturæ vix anteriores sed interiores, h. e. dorso capitis propiores. Lingua lata, obtusa, crassa, brevis. Branchiarum opercula nuda, lævissima. Membrana branchiostega 6-radiata. Gula dilatabilis. Humeri elevati crassiusculi. Dorsum acutum, attenuatum, posticè deorsum rotundatum. Latera plana. Linea lateralis ad basin capitis incipit, dorso propior, secundum flexuram dorsi arcuata, in postremâ caudâ descendit. Anus ante medium piscis, a pinnâ anali remotus. Cauda brevis lata, plana, valdè compressa. Pinna dorsalis, paulo ante medium dorsi incipiens, in summo dorso spinosa, posticè mutica, elevata, usque ad caudam extenditur: pars spinosa 8-radiata; radii 1 et 2 brevissimi, adpressi, 3^{tius} longus dein sensim breviores, 8^{vus} a reliquis ad partem muticam parum remotus: pars mutica 21-radiata, æqualis, posticè rotundata, basi squamosa. Pinnæ pectorales falcatæ, ad caudam elongatæ, muticæ, 17-radiatæ; radius 6^{tus} longissimus. Pinna analis 20-radiata; radii tres anteriores spinosi, breves decumbentes, reliqui mutici, longi, pinnam efficientes parti posterioris dorsalis simillimam, basi squamosam. Pinnæ ventrales ovatæ, acuminatæ, breves, sed pone anum extensæ, 6-radiatæ; radius 1^{mus} spinosus, validus, 2^{dus} longissimus, apice subramentaceus. Pinna caudalis lata, subcuneata, subtruncata, in medio parum rotundata, angulis lateralibus acutis parum productis, 17-radiata. Squamæ mediocres, arctè adhærentes. Br. 6; D. 8|21; A. 3|17; C. 17; P. 17; V. 1|5.

"Color totius piscis argenteus: latera a summo dorso infra medium maculis nigris* ornata; maculæ seriebus transversalibus, inæqualibus dispositæ. Fig. Pict. Piscis sæpè sesquipedem longus."—*Pisc. Nov. Holl.*

* Parkinson has noted beneath his sketch, that "the whole fish is silvery with fuscous spots."

Cuvier considers this fish to be the same with the *Chætodon punctatus* of Linnæus, and also with the *Latte* of Russell (No. 69). Parkinson's pencil sketch above quoted represents the spinous part of the dorsal as lower, and the articulated part as higher than Russell's figure. And on comparing it with plate 179 in the 'Histoire des Poissons,' the mouth appears a little larger, the profile of the nape less gibbous, and the first jointed rays of the dorsal higher, rendering that part of the fin more even anteriorly, though it is equally rounded posteriorly with Cuvier's figure. The anal is also higher anteriorly and is rounded throughout, and a few radiating lines are indicated on the limb of the preoperculum. In all other respects the resemblance between Parkinson's sketch and the plate in the 'Histoire des Poissons' is close. In this work the species is said to frequent the Malabar coast and the seas of Java, New Guinea, and China.

CHELMON MARGINALIS (*Nob.*), the Willèmawillum.

No. 12. Mr. Gilbert's collection.

Only two species of *Chelmon* are described in the 'Histoire des Poissons,' and these are very readily distinguished from each other by the relative length of their beaks and the form and extent of the spinous part of their dorsals, as well as by the very different patterns of colour they exhibit. Mr. Gilbert's fish so closely resembles the best known species, the *Chelmon rostratus*, in general form as well as in part of its markings, that I have some hesitation in proposing it as a distinct species on the strength merely of the characters of a single individual. It wants two vertical bands on the body which *rostratus* possesses, and the anal fin is decidedly more angular than the dorsal, which is rounded, the reverse being the case in *rostratus*. There is also a submarginal dark band round the soft part of these two fins in the proposed species, which is not noted in the descriptions or shown in the figures of *rostratus*. Mr. Gilbert states that his fish is the 'willèmawillum' of the aborigines, and that it frequents shallow rocky places and sandy beaches in all the bays of Port Essington. The faculty of shooting a drop of water from the mouth so as to strike an insect, which the members of this genus possess in common with the *Toxotes*, is, I have reason to believe, enjoyed also by an undescribed New Holland *Holocanthus*, which greatly resembles *Chelmon* in the prolongation of the snout.

The proportions of the Port Essington *Chelmon* are almost the same with those of the common *rostratus*. The snout, measured from the nostrils, is exactly one-sixth of the total length, caudal included; which again is double the height of the body. The anal fin forms

a spherical triangle with the apex a little blunt; the dorsal is much more widely rounded, being the segment of an obtuse ellipse. The finely grooved and toothed upper edge of the orbit projects a little, rendering the forehead wider than the occiput or snout. The preorbitar is oblong, with a convex under-border irregularly armed with acute teeth. The ascending limb of the preoperculum is finely and closely toothed; the teeth are a little larger on the angle, and on the lower limb they are more acute and farther apart. The operculum is cut away in a wide and very shallow sinus, the points at its extremities being bluntish. The membranous border is moderately broad. The supra-scapular is toothed, and the scapula, which is more conspicuous, is more strongly and acutely serrated. The humeral is also acutely toothed. The scales are strongly and closely furrowed on the border and ciliated with teeth. The lateral line, traced on scales smaller than the rest, forms an arc of a nearly circular curve, until it comes opposite to the few last rays of the dorsal, when it changes abruptly to a straight course through the tail.

Rays:—D. 9|29; A. 3|18; C. $16\frac{2}{2}$; P. 15; V. 1|5.

The dorsal, anal and ventral spines are strong and moderately compressed as in *rostratus*. The caudal is square at the end, with a slight tendency to convexity. The scaly sheath envelops the spinous part of the dorsal to the tips of most of the spines. It is the slight development of this sheath in *longirostris*, together with the greater size of the spines, which forms the most striking difference in the shape of that species, exclusive of the greater length of its snout. The first soft ray of the ventral tapers to a filamentous tip, similar to that of the species just named.

The colours cannot be certainly known from the dried specimen, which is otherwise in good condition and presents three vertical bands, all formed by narrow black borders enclosing a nearly even stripe of a somewhat yellower tinge than the rest of the fish, but not of a darker hue. The ocular band commences high on the nape, passes through the eye, and terminates on the fore-part of the interoperculum: it is wider on the cheek than above the eye. The second band takes in the two first dorsal spines and terminates at the ventral: its fore-border cuts the bony operculum vertically a little anterior to its centre, and its hinder one passes down the membranous edge of the gill-flap, the supra-scapular and scapula being included in its breadth. The third band crosses the tail at the base of the caudal. A narrow band of the same kind edges the soft parts of the dorsal and anal, the caudal band just mentioned forming a connecting link between the borders of the two fins. The bands follow the contour of the fins exactly, the anal one being somewhat angular and the dorsal one elliptical, and though they are narrower than the vertical bands on the body, they have broader interior black edges. There is not the slightest trace of the eyed spot on the dorsal, or of the two vertical bands which cross the body in *rostratus*, but there are faint longitudinal lines coincident with the junctions of the rows of scales, the middle sections of the scales being more silvery. Under the microscope the scales appear

to be sprinkled with minute black specks. There is a mesial black stripe on the forehead extending from between the eyes to the base of the upper jaw.

Dimensions.	inches.	lines.
Length from tip of beak to end of caudal fin	6	0
——— base of caudal fin	5	0
——— anus	3	2
——— pectoral	2	2
——— ventral	2	2
——— dorsal	0	0
——— tip of gill-flap	1	1
——— centre of eye	1	3¾
Diameter of the eye	0	5
Length of ventral spine	0	10
——— soft ventral rays	1	4
——— ninth dorsal spine	1	1
——— third anal spine	1	0
Height of soft dorsal	1	8
——— soft anal	1	2½
——— body	3	0
——— body and vertical fins	4	2

PLATAX LESCHENALDI (*Cuv. et Val.*?), the Kahi-sandawa.

No. 4. Lieut. Emery's drawings.

The specimen from which Lieut. Emery made his drawing was taken in Talc Bay, and measured eight inches in length, and fifteen between the extended tips of the dorsal and anal fins. The figure does not agree in all points with the 'Kahi-sandawa of Russell, which is the *Platax Leschenaldi* of the 'Histoire des Poissons,' but it resembles it so much, that it seems better to direct the attention of naturalists to it under that designation, rather than under a new specific name. Russell describes four vertical bands as existing in the young of the *Kahi-sandawa*, and states that they disappear as the fish increases in age. The wide range of the Kahi-sandawa, from India to New Guinea, increases the probability of its being also an inhabitant of the seas which wash the northern coasts of New Holland.

Lieut. Emery's drawing represents the dorsal and anal fins as triangular in profile, their posterior edges being not falciform, but almost perfectly straight. The height of the dorsal rather exceeds that of the body, and is considerably greater than that of the anal. The caudal terminates in a slightly waving line, convex in the middle and a little concave towards the two angles, which are acute. The pointed ventrals reach half way along the anterior border of the anal. The profile is steeply convex from the mouth to the ventrals, and also upwards to the beginning of the dorsal, which rising still more precipitously, renders the outline slightly concave before its base. The height of the body, measured a little obliquely, from the base of the first jointed dorsal rays to the beginning of the anal, is

equal to the length of the fish, caudal excluded. The caudal forms rather more than a sixth part of the total length. The scales are tolerably large. Fewer rays are indicated in the fins than in any species described in the 'Histoire des Poissons,' the dorsal ones being two less, and the anal ones merely equal in number to those of *batavianus*, but it is not very probable that Lieut. Emery counted all the small posterior rays of these fins.

The colour of the body is primrose-yellow, that of the two vertical bands and the pectoral fin yellowish brown, and of the other fins dark oil-green. The ocular band passes over the forehead, includes two-thirds of the eye and the corner of the mouth, and terminates on the belly before the ventrals. The pectoral band, of nearly uniform breadth throughout and broader than the ocular band, crosses the nape, takes in the edge of the gill-flap, and spreads on the side to the width of two-thirds of the length of the pectoral: it terminates on the belly immediately behind the ventrals. There is a small triangular black mark on the base of the pectoral.

Platax orbicularis (*Cuv.*), Orbicular Platax.

"*Chætodon orbicularis*, Forskal."
Platax orbicularis, Rüppel, Atl. 67. t. 13. f. 3; Cuv. & Val. vii. p. 332. No. 37. Mr. Gilbert's list.

This fish, according to Mr. Gilbert, frequents most parts of the harbour of Port Essington, and swims near the surface, which renders it an easy mark for the spears of the natives, who name it 'be-role-coord.' It agrees in so many points with the *Platax orbicularis* of the Red Sea, first described by Forskal and since figured by Rüppel, that I have no hesitation in considering it to be the same species. Rüppel's figure is stated in the 'Histoire des Poissons' to have been sketched from a young individual, and shows an ocular and a humeral band, which were not visible in the specimen presented to Cuvier by Rüppel, nor do any traces of them exist in the example brought from Port Essington. The vertical bands, so common in the fish of this genus, are said to disappear as the individual increases in age. In the 'Histoire des Poissons' the dorsal is said to be rounded and the anal a little angular. M. Rüppel's figure shows a dorsal more angular than the anal, while in Mr. Gilbert's specimen both these fins are much rounded, the anal however coming nearest to a circular arc, because of its shortness and greater height, the curve of the dorsal being more lengthened, and in proportion a little more elevated anteriorly.

In the dried specimen the back and sides have a tint intermediate between broccoli-brown and honey-yellow, the under parts being paler with much nacry lustre. The pectorals are colourless, the ventrals are broadly tipped with brownish black, and the anterior edge of the anal is widely bordered with the same, the rest of the margin of that fin and the margins of the dorsal and caudal being narrowly fringed with black. M. Rüppel's figure omits the black border of the fore-part of the anal, and shows a broader fringe of that tint on the rest of the fins. His text describes the colour of the fresh

fish as brownish and silvery, with an unctuous metallic lustre; the ventrals as blackish brown, and the vertical fins as chestnut-brown, all with black edges; the pectorals being hyaline. Both Forskal and Rüppel notice certain individuals as having small irregular black spots scattered on the sides. The Port Essington fish has about twenty brownish dots dispersed on the flanks behind the pectoral fin and below the lateral line. The caudal fin, which is represented in the figure as being slightly concave on the margin, has in the Port Essington fish also a concave edge, but not evenly so, the centre being convex, yet not projecting so far as the angles, which are rather acute. The thickness of the scaly covering is such that the number of rays in the fins cannot be ascertained except by dissection, and the three works which have described the species disagree in their enumeration. I have therefore taken much pains to be correct in this point, and find them to be as follows:—

Rays:—B. 6;	D. 5|34;	A. 3|26;	C. 18;	P. 16;	V. 1|5;	Port Essing. specim.
5;	5|36;	3|25;	20;	16;	1|5;	Rüppel. —
6;	3|33;	0|26;	.....			Forskal. —
	3|32;	3|25;	.....			Cuv. & Val. —

The first dorsal spine is very short; its interspinous bone has been mostly removed from the specimen. The occipital crest is three-sided and tapering, without enlargements. There is a wide furrow between the eyes. The upper margin of the orbit is striated, the suborbitars are irregularly gouged on the surface, and the naked limb of the preoperculum is irregularly striated at the angle, and minutely crenated on its lower limb, the widely rounded angle, and half its ascending edge. The bony operculum is rounded at its upper angle and pretty deeply concave below, the sinus being filled by membrane supported by the projecting point of the suboperculum. This last-named bone is widest at its junction with the interoperculum, but at one-third of its length from thence it suddenly narrows and then tapers to its point. There are three small pores on each limb of the lower jaw. The teeth form a dense brush-like band on each jaw, the dental surface being flat. The teeth of the outer row are rather the strongest and are tricuspid, the middle point being the largest and longest.

There are fifty scales in a row between the gill-opening and caudal fin, and about fifty-five in a vertical line, of which fifteen are above the lateral line. They are roundish, with from eight to twenty-four furrows on their basal borders, varying according to the place from whence they are taken.

Rüppel states eighteen inches as the usual length of the species. The Port Essington specimen measures as follows:—

Dimensions.	inches.	lines.
Length from intermaxillary symphysis to tip of caudal	17	6
——————————————— base of caudal	14	6
——————————————— anus	8	2
——————————————— edge of gill-cover ...	5	0
——————————————— centre of orbit.....	2	9

Dimensions.	inches.	lines.
Diameter of orbit	1	2
Length of ventral fins	4	6
——— pectorals	3	0
——— caudal	3	0
Height of anal	3	3
——— dorsal, measured directly	2	7
——— dorsal, measured along the rays	4	6
——— body between fore-part of dorsal and anus	10	2
——— fish including anal and dorsal	14	2

[To be continued.]

IX.—*Observations on the genera* Zygnema, Tyndaridea, *and* Mougeotia, *with descriptions of new Species.* By Arthur Hill Hassall, Esq., M.R.C.S.L., Corresponding Member of the Dublin Natural History Society.

It is the general belief of Cryptogamic physiologists that union of the filaments of the different species composing the genera *Zygnema*, *Tyndaridea*, and *Mougeotia* is indispensable to the production of fertile spores. This belief I consider to be erroneous so far as the genus *Zygnema* is concerned, as I think that I have the means of satisfactorily proving. In three species of *Zygnema* which I have recently met with, and which I have named *Zygnema quadratum*, *Z. intermedium* and *Z. angulatum*, the filaments do not unite, and yet all equally produce spores, only two of which, however, it is remarkable to observe, are placed in contiguous cells, and on one side of each of these a cell void of contents is invariably situated, a channel of communication being set up between every two cells, that is, between an empty one, and that which contains a seed, by means of a hollow process, situated at the point of junction of the cells, through which the contents of one cell passes into and mingles with those of the other *.

From a consideration of the structure of these species, the accuracy of which cannot be doubted, it is evident that conjugation is not essential to the production of spores, and therefore, that the supposition entertained by some that the entire of one filament contains fertilizing matter, and the other that which is to be fertilized, is erroneous; while it is apparent from the disposition of the spores, not more than two being juxtaposed, and of empty cells, that each filament includes both forms of reproductive matter so disposed as to lie in adjacent cells.

Should future observation disclose the fact, that this alter-

* A species of *Mougeotia*. *M. notabilis* likewise produces spores without conjugation of the filaments.—A. H. H.